High Performance Hybrid Micro-Computer

Abstract: The Field Programmable Instrument Controller (FPIC) is a stand-alone low to high performance, clocked or unclocked multi-processor that operates as a microcontroller with versatile interface and operating options. The FPIC can also be used as a concurrent processor for a microcontroller or other processor. A tightly coupled Multiple Chip Module design incorporates non-volatile memories, a large field programmable gate array (FPGA), field programmable high precision analog to digital converters, field programmable digital to analog signal generators, and multiple ports of external mass data storage and control processors. The FPIC has an inherently open architecture with in-situ reprogrammability and state preservation capability for discontinuous operations. It is designed to operate in multiple roles, including but not limited to, a high speed parallel digital signal processing; co-processor for precision control feedback during analog or hybrid computing; high speed monitoring for condition based maintenance; and distributed real time process control. The FPIC is characterized by low power with small size and weight.